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**DEPARTMENT OF
ENERGY**

**Concerns with Major
Construction Projects at the
Office of Environmental
Management and NNSA**

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Natural Resources and Environment



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Highlights of [GAO-13-484T](#), a testimony before the Subcommittee on Energy and Water Development, and Related Agencies, Committee on Appropriations, House of Representatives

Why GAO Did This Study

DOE relies primarily on contractors to carry out its diverse missions and operate its laboratories and other facilities, with about 90 percent of its annual budget spent on contracts and capital asset projects. Since 1990, GAO has reported that DOE has suffered from substantial and continual weaknesses in effectively overseeing contractors and managing large, expensive, and technically complex projects. As of February 2013, EM and NNSA remained on GAO's list of areas at high risk of fraud, waste, abuse, and mismanagement for major contract and project management.

This testimony, which is primarily based on GAO reports issued from March 2009 to December 2012, focuses on (1) prior GAO findings on DOE major projects and the impact of recent DOE steps to address project management weaknesses and (2) preliminary observations from GAO's ongoing work on the reasons behind the planned increase in the performance baseline—a project's cost, schedule, and scope—for two projects being constructed as part of NNSA's Plutonium Disposition Program—the MOX facility and the Waste Solidification Building.

GAO is making no new recommendations. DOE and NNSA continue to act on the numerous recommendations GAO has made to improve management of the nuclear security enterprise. GAO will continue to monitor DOE's and NNSA's implementation of these recommendations.

View [GAO-13-484T](#). For more information, contact David C. Trimble at (202) 512-3841 or trimbled@gao.gov.

March 2013

DEPARTMENT OF ENERGY

Concerns with Major Construction Projects at the Office of Environmental Management and NNSA

What GAO Found

In response to GAO reports over the past few years on management weaknesses in major projects (i.e., those costing \$750 million or more), the Department of Energy (DOE) has undertaken a number of reforms since March 2009, including those overseen by the Office of Environmental Management (EM) and the National Nuclear Security Administration (NNSA). For example, DOE has updated program and project management policies and guidance in an effort to improve the reliability of project cost estimates, better assess project risks, and better ensure project reviews that are timely and useful, and that identify problems early. In addition to actions taken to improve project management, in its 2012 work, GAO has noted DOE's progress in managing the cost and schedule of nonmajor projects—those costing less than \$750 million. DOE's actions to improve project management are promising, but their impact on meeting cost and schedule targets is not yet clear. Because all ongoing major projects have been in construction for several years, neither EM nor NNSA has a major project that can demonstrate the impact of DOE's recent reforms.

GAO's ongoing review of NNSA's Plutonium Disposition Program, including examining recent problems with the ongoing construction of the Mixed Oxide (MOX) Fuel Fabrication Facility and the Waste Solidification Building at the Savannah River Site in South Carolina, has resulted in some preliminary observations that highlight the need for continued efforts by DOE to improve contract and project management. DOE is currently forecasting an increase in the total project cost for the MOX facility from \$4.9 billion to \$7.7 billion and a delay in the start of operations from October 2016 to November 2019. Specifically, DOE is evaluating a project baseline change proposal prepared by NNSA's contractor for the MOX facility—a major project. The cost increase and schedule delay will not be known until DOE completes its review of the contractor's proposal and DOE's project oversight office completes an independent cost estimate of the project. With regard to the Waste Solidification Building—a nonmajor project—DOE approved a revised performance baseline in December 2012 to increase the cost from the initial estimate of \$344.5 million to \$414.1 million and a delay in the start of operations from September 2013 to August 2015. GAO's ongoing work is focused on several areas, including the following:

- critical system components' design adequacy,
- understanding the nuclear supplier base,
- changes in project scope,
- the effectiveness of project reviews; and
- lifecycle cost estimates for the Plutonium Disposition Program.

GAO plans to report on this ongoing work later this year.



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United States Government Accountability Office
Washington, DC 20548

Chairman Frelinghuysen, Ranking Member Kaptur, and Members of the Subcommittee:

Thank you for the opportunity to discuss our work on contract and project management at the Department of Energy (DOE). DOE, the largest civilian contracting agency in the federal government, relies primarily on contractors to carry out its diverse missions and operate its laboratories and other facilities, with about 90 percent of its annual budget spent on contracts and large capital asset projects. Since 1990, we have reported that DOE has suffered from substantial and continual weaknesses in effectively overseeing contractors and managing large, expensive, and technically complex projects. For example, in November 1996, we reported on the status of DOE's major projects and found that, as of June 1996, most of the completed projects and at least half of the 34 ongoing projects were experiencing cost overruns and/or schedule slippages.¹ We also reported that some ongoing projects were never finished and that three completed projects had not been used for their intended purposes at the time of our review.

In the 1990s, DOE began implementing a series of reforms that included efforts to strengthen project management practices, such as planning, organizing, and tracking project activities, costs, and schedules; training to ensure that federal project managers had the required expertise to manage projects; increasing emphasis on independent reviews; and strengthening project reporting and oversight. Furthermore, as we testified before this Subcommittee in March 2009,² DOE undertook additional actions to improve contract and project management, including a department-wide root-cause analysis and subsequent corrective action plan to address identified weaknesses. We noted in our 2009 testimony that DOE had added nearly \$14 billion and 45 years to its initial cost and schedule estimates of then ongoing construction projects, and added an additional \$25 billion to \$42 billion and an additional 68 to 111 years to initial cost and schedule estimates of ongoing environmental cleanup

¹GAO, *Department of Energy: Opportunity to Improve Management of Major System Acquisitions*, [GAO/RCED-97-17](#) (Washington, D.C.: Nov. 26, 1996).

²GAO, *Department of Energy: Contract and Project Management Concerns at the National Nuclear Security Administration and Office of Environmental Management*, [GAO-09-406T](#) (Washington, D.C.: Mar. 4, 2009).

projects. We noted that the cost increases and schedule delays that occurred for most of these projects were attributable to an inconsistent application of project management tools and techniques on the part of both DOE and its contractors, including inadequate systems for measuring contractor performance, approval of construction activities before final designs were sufficiently complete, ineffective project reviews, and ineffective development and integration of the technologies used in these projects.

While DOE has taken many steps to improve contract and project management, the Office of Environmental Management (EM)—one of DOE’s largest program offices—and the National Nuclear Security Administration (NNSA)—a separately organized agency within DOE—continue to experience significant problems completing major projects on time and on budget. My testimony today is based primarily on reports we issued from March 2009 to December 2012 that assess DOE management of various major construction projects. Specifically, I will focus my testimony on (1) prior GAO findings on DOE major projects and the impact of recent DOE steps to address project management weaknesses and (2) preliminary observations from our ongoing work for this Subcommittee on the reasons behind the planned increase in the performance baseline—a project’s cost, schedule, and scope—for two projects being constructed as part of NNSA’s Plutonium Disposition Program—the Mixed Oxide (MOX) Fuel Fabrication Facility and the Waste Solidification Building at the Savannah River Site in South Carolina.³ Detailed information on our scope and methodology for our prior work can be found in these reports.

To develop our preliminary observations, we reviewed documents related to the performance baseline changes for both the MOX facility and Waste Solidification Building, interviewed NNSA and contractor officials, and visited the Savannah River Site to meet with project officials and observe the construction progress for both facilities. We are conducting our ongoing work in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings

³Mixed oxide fuel is a mix of plutonium and uranium.

and conclusions based on our audit objectives. We obtained NNSA's views on new information in our testimony concerning our ongoing work on the MOX facility and Waste Solidification Building.

Background

To manage major construction projects, DOE project directors in EM and NNSA are required to follow specific DOE directives, policies, and guidance for contract and project management. Among these is DOE Order 413.3B, which provides direction for planning and executing projects. To oversee projects and approve critical decisions, DOE conducts its own reviews, often with the help of independent technical experts. For example, for large projects (i.e., projects with a total cost of greater than \$100 million), DOE's Office of Acquisition and Project Management is required to validate the accuracy and completeness of a project's performance baseline as part of each important project step.

NNSA's largest ongoing construction project involves the disposition of surplus U.S. weapons-grade plutonium as part of the Plutonium Disposition Program. Under an agreement signed in 2000, the United States and Russia will each dispose of at least 34 metric tons of surplus weapons-grade plutonium by irradiating it as MOX fuel in nuclear reactors. A key part of the U.S. program includes the construction of two nuclear facilities at DOE's Savannah River Site: a MOX facility that will produce MOX fuel for nuclear reactors and a Waste Solidification Building to dispose of the liquid waste from the MOX facility. A third nuclear facility had been planned for the Savannah River Site to disassemble nuclear weapon pits (i.e., the spherical central core of a nuclear weapon that is compressed with high explosives to create a nuclear explosion)—the Pit Disassembly and Conversion Facility—and to provide plutonium feedstock for fuel fabrication. NNSA canceled the facility in January 2012 and, instead, decided to meet its feedstock requirements through existing facilities at DOE's Los Alamos National Laboratory and the Savannah River Site, including potentially the MOX facility. NNSA spent approximately \$730 million on the design of this facility prior to its cancellation.

DOE Has Continued to Implement Reforms, but Their Impact Is Not Yet Clear

A basic tenet of effective project management is the ability to complete projects on time and within budget. DOE has continued to experience management weaknesses in major projects (i.e., those costing \$750 million or more). In response, since March 2009, DOE has undertaken a number of new reforms to improve its management of major projects, including those overseen by EM and NNSA. For example, DOE has updated program and project management policies and guidance in an effort to improve the reliability of project cost estimates, better assess project risks, and better ensure project reviews that are timely and useful and that identify problems early. Further, in November 2010, DOE took steps to enhance project management and oversight by requiring peer reviews and independent cost estimates for projects with values of more than \$100 million. NNSA has also taken actions to improve the management of projects that it oversees. For example, in August 2012, the NNSA issued guidance calling for design work to be 90 percent complete before construction can begin to minimize design changes and associated cost increases and schedule delays.

Our 2012 work examining DOE's management of nonmajor projects—those costing less than \$750 million—indicates that DOE's reform efforts have helped in managing the department's cost and schedule targets. In particular, in December 2012, we reported that EM and NNSA were making some progress in managing some of the 71 nonmajor projects that were completed or ongoing for fiscal years 2008 to 2012 and that had a total estimated cost of approximately \$10.1 billion.⁴ For example, we identified some nonmajor projects that used sound project management practices, such as the application of effective acquisition strategies, to help ensure the successful completion of these projects. This was consistent with what we found in our October 2012 report on EM's cleanup projects funded by the American Recovery and Reinvestment Act of 2009.⁵ Of the completed projects we examined, 92 percent met the performance standard of completing project work scope without exceeding the cost target by more than 10 percent, according to EM data. In recognition of these improvements in the management of nonmajor

⁴GAO, *Department of Energy: Information Needed to Determine If Nonmajor Projects Meet Performance Targets*, [GAO-13-129](#) (Washington, D.C.: Dec. 19, 2012).

⁵GAO, *Recovery Act: Most DOE Cleanup Projects Are Complete, but Project Management Guidance Could Be Strengthened* [GAO-13-23](#) (Washington, D.C.: Oct. 15, 2012).

projects, we narrowed the focus of the designation of EM and NNSA on our 2013 high-risk list to major contracts and projects at EM and NNSA⁶.

DOE's actions to improve project management are promising, but their impact on meeting cost and schedule targets is not yet clear. Because all ongoing major projects have been in construction for several years, neither EM nor NNSA has a major project that can demonstrate the impact of DOE's recent reforms. As we have reported in the past few years, ongoing major projects continue to experience significant cost increases and schedule delays as shown in the following examples:

- In December 2012, we reported that the estimated cost to construct the Waste Treatment and Immobilization Plant in Hanford, Washington, had tripled to \$12.3 billion since its inception in 2000 and that the scheduled completion date had slipped by nearly a decade to 2019.⁷ Moreover, we found that DOE's incentives and management controls were inadequate for ensuring effective project management, and that DOE had in some instances prematurely rewarded the contractor for resolving technical issues and completing work.
- In March 2012, we reported that NNSA's project to design and construct the Chemistry and Metallurgy Research Replacement Nuclear Facility—a new plutonium facility at NNSA's Los Alamos National Laboratory—was expected to cost between \$3.7 billion to \$5.8 billion—nearly a six-fold increase from the initial estimate.⁸ In February 2012, NNSA deferred construction of the facility by at least an additional 5 years, bringing the total delay to between 8 and 12 years from NNSA's initial plan. A number of major problems contributed to this increase, including infrastructure-related design changes.

⁶We update our list of areas at high risk of fraud, waste, abuse, and mismanagement every 2 years. GAO, *High-Risk Series: An Update*, [GAO-13-283](#) (Washington, D.C.: February 2013).

⁷GAO, *Hanford Waste Treatment Plant: DOE Needs to Take Action to Resolve Technical and Management Challenges*, [GAO-13-38](#) (Washington D.C.: Dec. 19, 2012).

⁸GAO, *Modernizing the Nuclear Security Enterprise: New Plutonium Research Facility at Los Alamos May Not Meet All Mission Needs*, [GAO-12-337](#) (Washington, D.C.: Mar. 26, 2012).

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- In November 2010, we reported that NNSA's plans to construct a modern Uranium Processing Facility at its Y-12 National Security Complex in Oak Ridge, Tennessee, had experienced significant cost increases.⁹ More recently, in September 2011, NNSA estimated that the facility would cost from \$4.2 billion to \$6.5 billion to construct—a nearly seven-fold cost increase from the original estimate. In addition, NNSA has delayed the expected completion date by 11 years, to 2023. In the November 2010 report, as well as in a January 2010 report,¹⁰ we found a number of major problems that contributed to this increase, including preparation of a cost estimate in 2007 that did not meet all cost estimating best practices. Also, 6 of 10 technologies to be used in the facility were not sufficiently mature, which could lead to cost and schedule delays if the technologies do not perform as intended.

In regard to nonmajor projects, while we reported in December 2012 on progress by EM and NNSA in managing nonmajor projects, we also found that of the 71 nonmajor projects that EM and NNSA completed or had under way from fiscal years 2008 to 2012, 23 projects did not meet or were not expected to meet one or more of their three performance targets for scope, cost, and completion date.¹¹ We also noted that, for 27 projects, many had insufficiently documented performance targets for scope, cost, or completion date, which prevented us from determining whether they met their performance targets. As we noted in our February 2013 high-risk report, while we have shifted our focus to major contracts and projects, we will continue to monitor the performance of these nonmajor projects.

In these reports and others, we have made recommendations calling on DOE to ensure that project management requirements are consistently followed, to improve oversight of contractors, and to strengthen accountability, among others. DOE has generally agreed with these recommendations and has taken action to address many of them. We will

⁹GAO, *Nuclear Weapons: National Nuclear Security Administration's Plans for Its Uranium Processing Facility Should Better Reflect Funding Estimates and Technology Readiness*, [GAO-11-103](#) (Washington, D.C.: Nov. 19, 2010).

¹⁰GAO, *Actions Needed to Develop High-Quality Cost Estimates for Construction and Environmental Cleanup Projects*, [GAO-10-199](#) (Washington, D.C.: Jan. 14, 2010).

¹¹[GAO-13-129](#).

continue to monitor DOE's project management and its implementation of their actions to resolve project management weaknesses.

GAO's Ongoing Review of NNSA's Plutonium Disposition Program Highlights the Need for Continued Efforts to Address Project Management Weaknesses

Our ongoing review of NNSA's Plutonium Disposition Program, including examining recent problems with the ongoing construction of the MOX facility—a major project—and the Waste Solidification Building—a nonmajor project—has resulted in some preliminary observations that highlight the need for continued efforts by DOE to improve contract and project management. DOE is currently forecasting an increase in the total project cost for the MOX facility from \$4.9 billion to \$7.7 billion and a delay in the start of operations from October 2016 to November 2019. Specifically, DOE is evaluating a project baseline change proposal prepared by NNSA's contractor for the MOX facility.¹² The cost increase and schedule delay will not be known until DOE completes its review of the contractor's proposal and DOE's project oversight office completes an independent cost estimate. DOE currently plans to complete its review and approve a new project baseline by September 2013. With regard to the Waste Solidification Building, DOE approved in December 2012 a revised performance baseline to increase the cost from the initial estimate of \$344.5 million to \$414.1 million and a delay in the start of operations from September 2013 to August 2015.

Our ongoing work is focused on several areas, including the following:

- *Critical system components' design adequacy.* According to NNSA officials and the contractor for the MOX facility, one of the primary reasons for the proposed cost increase and schedule delay is due to inadequately designed critical system components, such as the gloveboxes used in the facility for handling plutonium and the infrastructure needed to support these gloveboxes. According to these officials, although the design of the facility is based on a similar facility in France, the cost of adapting the French design to the design needs of this project was not well understood when the project was approved for construction. The performance baseline for the MOX facility was also set several years before NNSA issued guidance in 2012 to set cost and schedule baselines only after design work is 90 percent

¹²A project's baseline change proposal provides a complete description of a proposed change to an approved performance baseline, including the resulting impacts on the project's cost, schedule, and scope.

complete. As part of our ongoing work, we are evaluating whether such guidance would have been useful for NNSA to apply to the MOX facility, as well as the potential impact this guidance might have had on mitigating cost increases and schedule delays.

- *Understanding the nuclear supplier base.* According to NNSA officials and the contractor for the MOX facility, another primary reason for the proposed cost increase and schedule delay is not adequately understanding the ability of the nuclear industry to fabricate and deliver nuclear-quality components to meet the project schedule. Under the terms of the MOX facility contract, the contractor was required to submit, beginning at the completion of preliminary design, semiannual reports regarding the condition of the construction and equipment markets and identify factors, such as availability of labor, materials, and equipment that may affect the cost or schedule for completing the MOX facility. As part of our ongoing work, we plan to review these reports to understand the extent to which the contractor had assessed market conditions.
- *Changes in project scope.* Our ongoing review of the MOX facility includes examining NNSA's direction to its contractor to add to the scope of the construction contract to include capability that NNSA had planned for the cancelled Pit Disassembly and Conversion Facility. As part of our ongoing work, we will examine the extent to which this change in scope affects the cost and schedule of the project and the extent to which this change is consistent with a December 2012 memo from the Deputy Secretary of Energy that emphasizes the importance of improving upfront planning, including changes in scope, as well as defining contract requirements prior to issuing a solicitation.
- *Effectiveness of project reviews.* NNSA project reviews of the MOX facility and the Waste Solidification Building have identified challenges to meeting the facilities' performance baselines and made related recommendations. For example, 2011 and 2012 peer review reports of the MOX facility identified concerns regarding installation rates for equipment and recommended that realistic installation rates be included in the cost estimate. However, the NNSA contractor's 2012 baseline change proposal ultimately cited installation rates as one of the drivers of the proposed cost increase. As part of our ongoing work, we are continuing to gather information on what actions NNSA and its contractor took when the 2011 peer review first raised the concern and the extent to which any actions were taken in response to the review. We are also continuing to gather information on project reviews of the Waste Solidification Building, to determine how

responsive program officials were to the findings and recommendations of these reviews.

- *Life-cycle cost estimate for the Plutonium Disposition Program.* In addition to setting the cost and schedule performance baselines of the MOX facility and Waste Solidification Building, NNSA has developed a life-cycle cost estimate for the overall effort of the Plutonium Disposition Program to dispose of at least 34 metric tons of surplus weapons-grade plutonium. NNSA officials told us that there has never been a review of this life-cycle estimate by an outside entity but that they are conducting an independent assessment of portions of the life-cycle cost estimate, including the operating cost of the MOX facility. As part of our ongoing work, we are reviewing NNSA's preliminary life-cycle cost estimate and the steps NNSA is taking to validate this cost estimate.

We plan to report on this ongoing work later this year.

Chairman Frelinghuysen, Ranking Member Kaptur, and Members of the Subcommittee, this completes my prepared statement. I would be pleased to respond to any questions that you may have at this time.

GAO Contact and Staff Acknowledgments

If you or your staff members have any questions about this testimony, please contact me at (202) 512-3841 or trimbled@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this testimony. GAO staff who made key contributions to this testimony are Dan Feehan and Kiki Theodoropoulos, Assistant Directors; and Joseph Cook, and Cristian Ion.

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